<TUFTEC TECHNICAL BULLETIN>

TUFTEC® H1043

(Compatibilizer for PS/PP Blend)

ASAHI CHEMICAL INDUSTRY CO., LTD.

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TUFTEC H1043 for PP/PS Blend

Polystyrene (PS) and Polypropylene (PP) are typical conventional plastics and widely used. While PS has high rigidity and good processability, the oil resistance and properties at elevated temperature are not sufficient. On the other hand, PP has good oil resistance and good properties at elevated temperature.
In order to be compatible with the strong points of PP and PS, PS/PP blends have been investigated, but have not succeeded so far because of their poor miscibility.

TUFTEC® H1043 is a newly developed compatibilizer especially for PP/PS blend, and gives excellent miscibility of PS/PP blends. PS/PP blends with H1043 show good oil resistance, good properties at elevated temperature, high rigidity and good processability. Such a PS/PP blend can be used for food containers and trays, substitution of ABS for electric appliances and automotive parts.

Table-1 Basic properties of TUFTEC® H1043

item	unit	test method	test conditions	TUFTEC® H1043
Specific Gravity	-	ASTM D297	-	0.97
MFR	g/10 min	ASTM D1238	230 °C 2.16 kg	2
Hardness	-	ISO 7619 7619-86	type D	72
Tensile Strength	MPa	JIS K6251 K6251	No. 3 Dumbbell 10 mm/min.	10.3
Elongation	%	JIS K6251 K6251	No. 3 Dumbbell 10 mm/min.	20
S/EB ratio				67/33
Physical Form				Pellet

Properties of HIPS/PP Blend with TUFTEC H1043

Table-2 Properties of Injection molded sample
Composition : HIPS / PP / TUFTEC = 70 / 30 / (6)

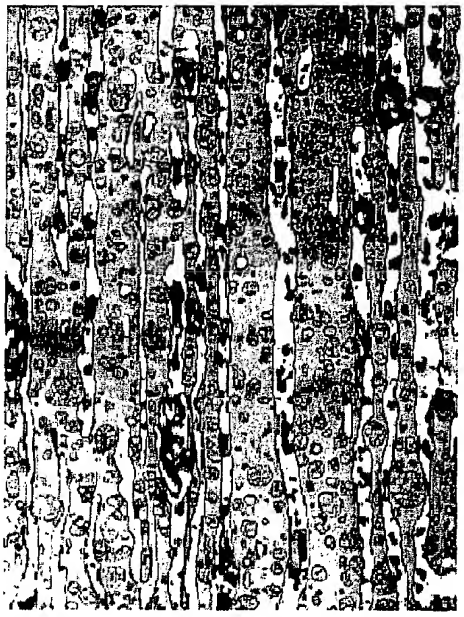
item	Test Method Test condition	unit	HIPS	PP	HIPS/PP without TUFTEC®	HIPS/PP with H1041	HIPS/PP with H1043
Specific Gravity	JIS K7112	-	1.05	0.90	0.99	0.99	0.99
MFR	ISO 1133 200 , 5 kgf	g/10 min.	6.6	8.5 230 , 2.16 kg	25	13	13
Tensile Strength	ASTM D638 5 mm/min	MPa	30.4	26.5	26.5	23.5	28.4
Elongation	ASTM D638 5 mm/min	%	19	>200	3	16	170
Flexural Strength	ASTM D790 3 mm/min.	MPa	52	31	46	40	46
Flexural Modulus	ASTM D790 3 mm/min.	MPa	2260	1080	1860	1570	1770
Notched Izod Impact strength	ASTM D256	Kg cm/cm	7.5	12.0	4.4	11.2	7.2
HDT	ASTM D648 4.6 kg	°C	87	105	91	89	89
Vicat softening point	ASTM D1525	°C	106	150	110	108	108

Table. 3 Properties of Extrusion Sheet (0.7 mm t)
Composition : HIPS / PP / TUFTEC = 70 / 30 / (6)

item	Test Method Test condition	unit	HIPS MFR (G): 2g/10 min.	HIPS/PP without TUFTEC®	HIPS/PP with H1041	HIPS/PP with H1043
Du Pont Impact	Falling weight: 136.5g (5 mm)	Kg/cm	12 ductile-brittle	0.5 brittle	11 ductile-brittle	23 ductile
Flexural Fatigue	JIS K7119	Times at break	MD: >50 TD: >50	MD: 1 TD: 1	MD: 10 TD: >50	MD: >50 TD: >50
Gross 60		%	30	41	51	68
Palm oil resistance	100 ,10 min.	-	Deformation Partially dissolved	No change	No change	No change

Morphology of HIPS/PP Blend

(a) HIPS / PP = 70 / 30



(b) HIPS / PP / H1041 = 70 / 30 / 6

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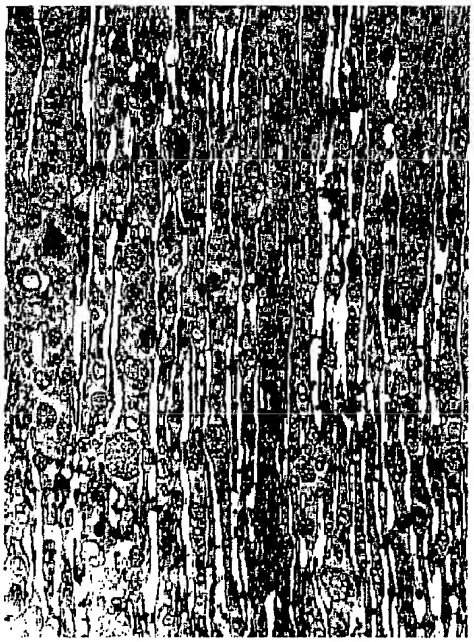

(C) HIPS / PP / H1043 = 70 / 30 / 6

Sample: Extrusion Sheet (t = 0.7 mm)
TEM method:
Thin cross section stained by RuO_4.
(Machine direction)

Matrix: HIPS (dark portion)
Elongated disperse domain: PP

CAUTION

These data are based on the documents, information and data available, as of the date of publication of this material, and may be changed when new knowledge or information is obtained.

Safe Handling

Material Safety Data Sheets on the products (hereinafter "Product") are available from Synthetic Rubber Division, Asahi Chemical Industry Co., Ltd. (hereinafter "Asahi"). Consult Material Safety Data Sheet before using product.

The following items are the summary of safe handling of Product. These items are pertinent only to Product as supplied. Various additives and processing aids used by your company have their own safe use profile and must be investigated separately.

Health and Safety

Avoid contact with skin and eyes when gases are generated in the drying and melting of Product. Do not breathe above gases. Do not touch a hot Product. Local ventilation and wearing of chemical resistant gloves, chemical safety goggles, etc. are necessary when Product is dried and melted.

FCombustibility

As Product is flammable, keep away from heat, sparks and flame when handling or storing Product. During a fire, irritating and highly toxic gases (for example CO gas) may be generated by thermal decomposition or combustion. Use water, foam and dry chemical as extinguishing media.

Disposal

Dispose of Product in accordance with applicable national, state and local laws and regulations ONLY or their equivalent. In incineration, irritating and highly toxic gases (for example CO gas) may be generated.

Do not dump into sewers, on the ground or into any body of water.

Storing

Store Product at dark and cool place without direct sunshine.

Others

Asahi warrants only that Product will perform according to the technical specifications provided in the MSDS and other materials provided by it.

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